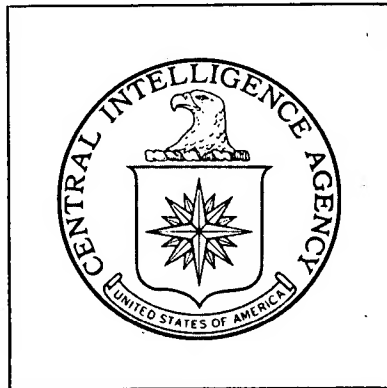


**Top Secret**



**DIRECTORATE OF  
INTELLIGENCE**

**Industrial Facilities  
(Non-Military)**

*Basic Imagery Interpretation Report*

**Mao-ming Shale Oil Refinery**

**Mao-ming, China**



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Directorate of Intelligence  
Imagery Analysis Service

RCS - 13/0277/69

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INSTALLATION OR ACTIVITY NAME		COUNTRY
Mao-ming Shale Oil Refinery		CH
UTM COORDINATES	GEOGRAPHIC COORDINATES	WAC-PIC NO.
49QDP875975	21-40-45N 110-52-57E	0615-13-A
MAP REFERENCE		
ACIC. USATC Series 200, Sheet M0615-14HL, 3rd edition, Mar 67, Scale 1:200,000		
(SECRET)		
LATEST IMAGERY USED		NEGATION DATE (If required)
		Not Required

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**ABSTRACT**

This report is a detailed description of the Mao-ming Shale Oil Refinery. The basic processing facilities at the refinery were completed prior to [redacted] however, processing facilities increased by approximately 30 percent, and storage tank facilities increased by approximately 50 percent during the 1964-1967 period. Thermal power plant and rail facilities were added during this period, and construction of a second shale oil retort building was resumed, indicating that production of shale oil will be increased at the refinery. Refinery products include gasoline, fuel oil, and lubricating oil. No facilities for the production of by-products could be identified. The refinery appeared to be in operation on most of the photography studied for the period from [redacted]. Construction activity is still evident at the refinery.

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This report includes a photograph of the refinery, a detailed line drawing, mensuration of storage facilities, a construction chronology, and reference data.

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**INTRODUCTION**

The Mao-ming Shale Oil Refinery is located approximately 15 nautical miles (nm) south-southeast of the town of Mao-ming (Kao-chou) and approximately 15 nm east of the town of Hua-hsien (Hua-chou). The Kung Kuan Railroad Yard [ ] is located 1 nm to the northwest of the refinery, and the Mao-ming Thermal Power Plant Refinery [ ] is located within the refinery itself. The refinery is somewhat isolated, but is well served by both rail and road. Shale is brought in by rail from a large open-pit mine located approximately 1.5 nm to the north and tailings from the shale oil retorts are deposited 1 nm to the northwest. A canal from the Chien Chiang River, to the west, and a canal from the South China Sea serve as sources of water for the refinery. There is a large water treatment facility to the immediate south of the refinery to process the incoming water. Two other very small shale oil plants which possibly served as pilot plants and several minor industries are located in the vicinity.

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25X1**BASIC DESCRIPTION**Physical Features

The refinery covers an area approximately one mile square, encompassing 640 acres. It is partially secured by a wall.

Operational Functions

The refinery extracts crude oil from shale and produces lubricating oil, fuel oil, and gasoline from this crude. No facilities for the production of by-products could be identified.

Status and Activity

The basic processing facilities at the Mao-ming Shale Oil Refinery were complete prior to August 1963. These were the shale oil retorts, the crude distillation units, the major secondary processing units, and some tank storage and support buildings. The secondary processing facilities were expanded by approximately 30 percent and storage tank facilities by about 50 percent during the 1964 to 1967 period. A new rail spur was also added in the southeast corner of the refinery. One shale oil retort building, construction of which was suspended in 1963 and resumed in 1967, was still being constructed in December 1968. This is evidence that shale oil production should increase at this facility.

Smoke was seen emanating from one stack when the refinery was first observed in August of 1963. The refinery appeared to be in operation on most of the photography studied for the period from [ ]

[ ] were the only exceptions. Emissions from the stacks were the most significant indicators of activity.

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The following is a general construction history of the refinery and its facilities: (see Figure 3)

August 1963 -- The refinery was only partially covered on photography, but appeared to be in operation.

September 1963 -- A shale oil retort building in Area A, three crude distillation units in Area F, a lubricating oil plant in Area G, a large induced-draft cooling tower, a pumphouse, a large spray pond in Area M, an open reservoir in Area E and another in Area K, and a large amount of tankage throughout the refinery had been completed. One shale oil retort building was incomplete and no construction activity related to it was observed.

November 1964 -- An open reservoir in Area K, six vertical processing units in Area I, and additional tankage had been completed.

October 1965 -- A processing building in Area I, additional tanks throughout the refinery area, and a rail spur in the southeast corner of the refinery had been completed. An expansion of the lubricating oil processing unit had begun in Area G.

February 1966 -- An open reservoir in Area K and a large coal processing and storage building in the Mao-ming Thermal Plant were completed.

December 1967 -- One U/I processing unit with a man-made pond in Area B, an U/I shale-handling facility in Area A, and an U/I building in Area E were completed. Construction activity was resumed on easternmost shale oil retort building.

December 1968 -- No significant additions were observed, however, construction activity was being continued on the easternmost shale oil retort building. Expansion of the lubricating oil processing unit was completed in Area G.

#### Facilities and Equipment

The following table lists the functional areas and facilities within the refinery. Approximate dimensions of the storage tanks are also presented.

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TABLE I

## Facilities and Equipment at the Mao-ming Shale Oil Refinery

<u>Area</u>	<u>Functional Description</u>	<u>Equipment*</u>
A	Shale Oil Retort Area	<p>One large retort building containing 4 shale oil extraction units</p> <p>One large retort building under construction containing 4 shale oil extraction units. Each extraction unit contains 16 retorts.</p> <p>1 Primary shale crushing building</p> <p>1 Secondary crushing building</p> <p>1 Screening building</p> <p>2 Vertical processing units</p> <p>1 Probable control building</p> <p>2 Probable compressor buildings</p> <p>1 Newly-constructed U/I shale-handling facility</p> <p>1 Railroad transfer facility</p> <p>2 Probable administrative buildings</p> <p>11 U/I buildings</p> <p>8 Cylindrical tanks</p> <p>6 diam. 20 ft.</p> <p>2 diam. 15 ft.</p>
B	U/I Processing Area	<p>3 Vertical processing units</p> <p>2 Processing buildings</p> <p>1 Large horizontal tank (80 ft. in length)</p> <p>4 Small U/I buildings</p> <p>1 Large man-made pond served by a pumphouse</p>
C	Storage Area	6 Large warehouses
D	Possible Treating Area	<p>1 U/I processing building</p> <p>3 Cylindrical tanks</p> <p>1 diam. 30 ft.</p> <p>2 diam. 25 ft.</p> <p>3 Horizontal tanks</p> <p>1-50 ft. in length</p> <p>2-40 ft. in length</p> <p>1 Semiburied tank</p>

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<u>Area</u>	<u>Functional Description</u>	<u>Equipment*</u>
E	Crude Oil Storage and Railroad Transfer Facility	20 Cylindrical tanks 5 diam. 120 ft. 14 diam. 80 ft. 1 diam. 50 ft. 1 Open reservoir (120 x 320 ft.) 1 U/I building 1 Railroad transfer facility with building
F	Crude Distillation Units and Probable Thermal Reforming Unit	7 Vertical processing units 4 Pipe furnaces 2 Compressor buildings 3 Probable control buildings 5 Banks of condensers/heat exchangers/cooling coils/accumulators
G	Probable Solvent Extraction and Deasphalting Unit with Finished Products Storage (Lubricating Oil Refining)	9 Vertical processing units 1 Compressor building 1 Pipe furnace 1 Probable control building 4 Horizontal pressure tanks (30 ft. in length) 44 Cylindrical storage tanks 5 diam. 50 ft. 5 diam. 40 ft. 4 diam. 25 ft. 2 diam. 20 ft. 14 diam. 15 ft. 6 diam. 10 ft. 8 diam. 5 ft. 2 Cylindrical storage tanks U/C 1 Open reservoir (90 ft. x 130 ft.) 1 Induced-draft cooling tower 2 U/I buildings
H	Probable Dewaxing (Paraffin) Plant and Clay Treatment Facility with Finished Product Storage (Lubricating Oil Refining)	1 Vented dewaxing building 1 Clay treatment building 1 U/I building 23 Cylindrical tanks (30 ft. diam.) 17 diam. 20 ft. 5 diam. 20 ft. 1 diam. 10 ft. 3 Horizontal tanks 1-70 ft. in length 2-20 ft. in length

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<u>Area</u>	<u>Functional Description</u>	<u>Equipment*</u>
I	Probable Shipping Area with Finished Product Storage	<ul style="list-style-type: none"> <li>1 Building</li> <li>1 Pipe furnace</li> <li>6 Batch agitators 20 ft. diam.</li> <li>6 Cylindrical tanks 30 ft. diam.</li> <li>1 Floating-top cylindrical tank (60 ft. diam.)</li> <li>7 Floating-top cylindrical tanks (80 ft. diam.)</li> <li>1 Probable pumphouse</li> </ul>
J	Thermal Power Plant	Plant is rail-served with extensive coal-handling facilities, a water treatment facility, a large stack, an electrical power sub-station, and support buildings. The entire area is secured by a wall.
K	Crude Oil Storage and Railroad Transfer Facility	<ul style="list-style-type: none"> <li>1 Railroad transfer facility</li> <li>2 Probable oil pumphouses</li> <li>17 Cylindrical tanks <ul style="list-style-type: none"> <li>1 diam. 120 ft.</li> <li>10 diam. 80 ft.</li> <li>4 floating-top diam. 60 ft.</li> <li>2 diam. 35 ft.</li> </ul> </li> <li>6 Cylindrical tanks U/C</li> <li>3 Open reservoirs <ul style="list-style-type: none"> <li>1-300 x 120 ft.</li> <li>1-200 x 120 ft.</li> <li>1-160 x 90 ft.</li> </ul> </li> <li>1 Pond with pumphouse</li> </ul>
L	Storage Area	14 Warehouses
M	Cooling Facilities	<ul style="list-style-type: none"> <li>1 Large spray pond served by 2 pumphouses</li> <li>1 Large induced-draft cooling tower</li> <li>1 U/I building</li> </ul>
N	Crude Oil Storage	<ul style="list-style-type: none"> <li>4 Cylindrical tanks (120 ft. diam.)</li> <li>4 Cylindrical tanks U/C</li> </ul>

\*NOTE: All dimensions given have been rounded off to the nearest five feet.

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FIGURE 2. MAO-MING SHALE OIL REFINERY.

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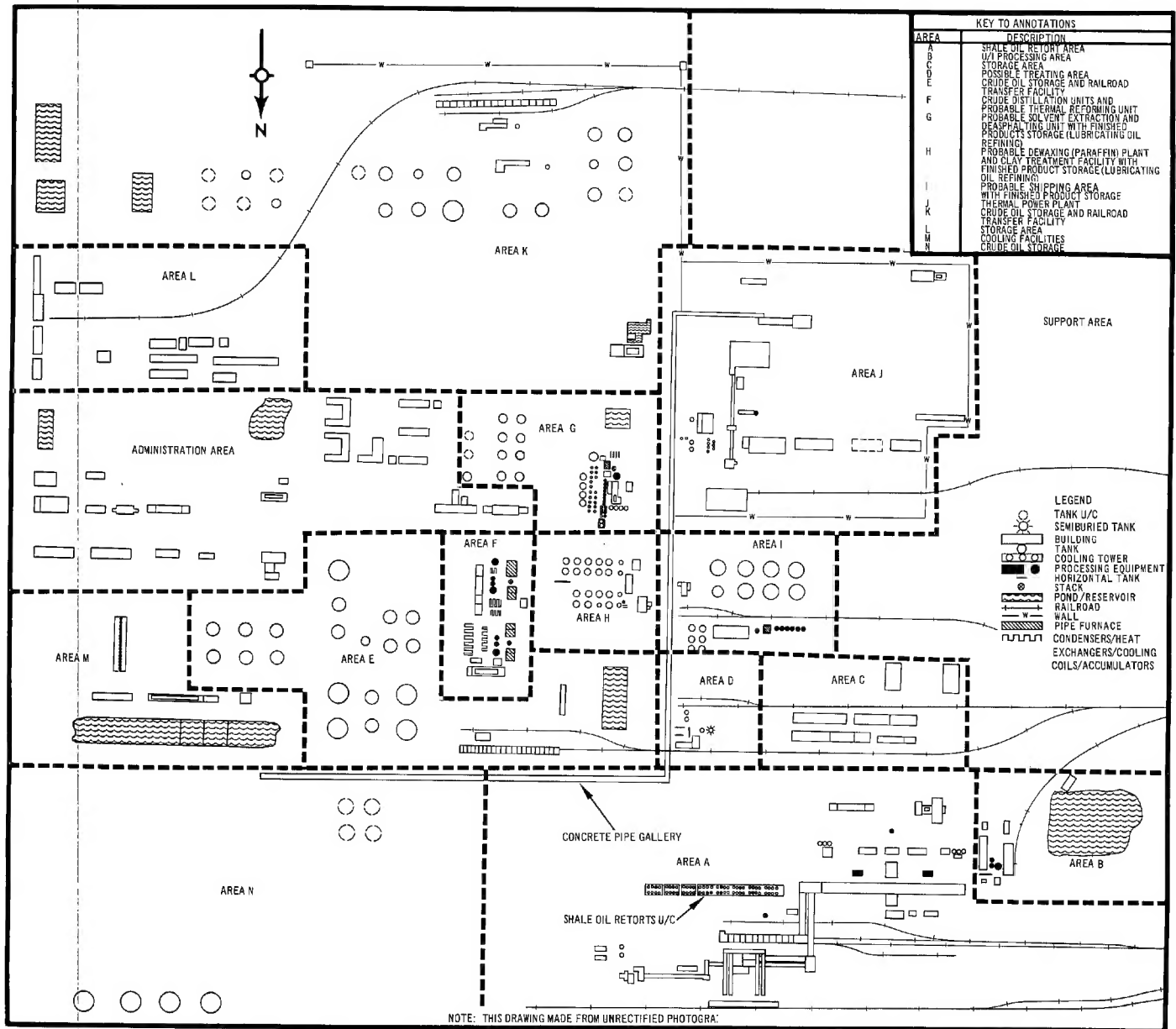


FIGURE 3. MAO-MING SHALE OIL REFINERY.

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REFERENCES

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Map

ACIC. US Air Target Chart, Series 200, Sheet M0515-14 HL. 3rd edition.  
Mar 67, Scale 1:200,000 (SECRET)

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Document

1. [REDACTED], China-Industries, Mao-ming Shale Oil Refinery, May  
1968 (SECRET)

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Requirement

EXSUBCOM - BR-N/002-69

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